SWRHL-95r

FINAL REPORT OF OFF-SITE SURVEILLANCE FOR THE MILROW EVENT, OCTOBER 2, 1969

by
Environmental Surveillance
Southwestern Radiological Health Laboratory

U. S. Department of Health, Education, and Welfare
Public Health Service
Environmental Health Service
Environmental Control Administration
Bureau of Radiological Health

LEGAL NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Atomic Energy Commission, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

June 1970

This surveillance performed under a Memorandum of Understanding (No. SF 54 373)
for the
U. S. ATOMIC ENERGY COMMISSION

ABSTRACT

Amchitka Island, a member of the Rat Island group in the Aleutian Islands, was first used for an underground nuclear test on October 29, 1965, by the Department of Defense. A second underground test, called the Milrow Event, was conducted by the Atomic Energy Commission at Amchitka on October 2, 1969. This report presents the operational procedures and results of the Public Health Service, Southwestern Radiological Health Laboratory off-site radiological safety and community information programs provided for Milrow.

The off-site radiological safety program included operating environmental surveillance networks of air samplers, thermoluminescent dosimeters and gamma-rate recorders before and after the detonation, and fielding 13 radiation monitors for the detonation. All surveillance and monitoring results indicated no increase in radioactivity above background levels in the off-site area following the event.

The community information program consisted of contacts with residents and local officials at various communities in Alaska to discuss the Milrow Event and off-site radiological safety program. A concentrated information program was conducted at Adak, Shemya and St. Paul to answer questions regarding Milrow Event effects at those locations.

TABLE OF CONTENTS

		Page
ABSTRACT		i
FIGURE		iii
LIST OF TABLES		iii
I.	INTRODUCTION	1
II.	OPERATIONAL GUIDE	2
	A. Responsibilities	2
	B. Organization	3
	C. Criteria	3
III.	OPERATIONAL PROCEDURES	4
	A. Community Information	4
	B. Monitoring	5
	1. Ground monitoring	5
	2. Aerial monitoring	5
	3. Shipboard monitoring	6
	C. Field Communications	7
IV.	ENVIRONMENTAL SURVEILLANCE	8
	A. Air Sampling	8
	B. Gamma-Rate Recorders	9
	C. Dosimetry	9
	D. Milk Sampling	10
	E. Water Sampling	11
	F. Reindeer and Caribou Sampling	11
	G. Marine Sampling	11
V.	RESULTS	13
VI.	SUMMARY	15

FIGURE AND LIST OF TABLES

FIGURE		Page
1.	SWRHL surveillance stations for the Milrow Event	22

TABLE		
1.	Summary of Milrow air sampling results	16
2.	Summary of Milrow dosimetry results	17
3.	Milrow water sampling results	19
4.	Milrow milk sampling results	21

I. INTRODUCTION

The Milrow Event was an underground nuclear detonation conducted by the Atomic Energy Commission on Amchitka Island, Alaska, at 1206 Bering Daylight Time(BDT), on October 2, 1969. In accordance with a Memorandum of Understanding with the Atomic Energy Commission, the Public Health Service, Southwestern Radiological Health Laboratory (SWRHL), conducted an off-site radiological safety and community information program for this event.

The off-site radiological safety program included collecting air and water samples and maintaining radiation dosimetry and recorder networks. Milk and caribou sampling were conducted through the PHS Pasteurized Milk Network and Reindeer and Caribou Sampling Program, respectively.

SWRHL community information activities included briefing residents at Shemya, Adak, and St. Paul and other surveillance stations on the planned detonation and SWRHL surveillance activities. Alaska health department and state fish and game department officials were also briefed on the SWRHL surveillance plan for Milrow.

This report describes the support provided and presents the results of the radiological surveillance and community information activities.

BLANK PAGE

II. OPERATIONAL GUIDE

A. Responsibilities

The Public Health Service (PHS), Southwestern Radiological Health Laboratory, serves as the off-site radiological safety organization for the Atomic Energy Commission (AEC) in accordance with an AEC-PHS Memorandum of Understanding, No. SF 54 373, as amended. The off-site areas of responsibility are those beyond the boundaries of the Nevada Test Site and other test locations designated by the AEC. Accordingly, SWRHL was responsible for conducting an off-site radiological safety program for the Milrow Event.

SWRHL responsibilities include:

1. Documenting the radiological situation in off-site areas through comprehensive environmental sampling and radiation monitoring.
2. Assuring continuous protection of public health and safety by determining potential and past exposures, and implementing protective measures as directed by the Test Manager.
3. Conducting a public contact and information program in the off-site area to assure local residents that all reasonable safeguards are being employed to protect public health and property from test effects.
4. Collecting information regarding incidents which may be attributed to the test program.

B. Organization

The Director, SWRHL, served as the Off-Site Radiological Safety Officer and was responsible for the overall off-site safety program for the Milrow Event. Alaska field activities were coordinated by the Milrow Project Officer from field headquarters located at Elmendorf Air Force Base near Anchorage, Alaska. Program planning and field activities were performed by the SWRHL Environmental Surveillance Program.

C. Criteria

For the Milrow Event, the following criteria for radiation exposure* were used for the off-site area:

> "...the criterion shall be 3.9 Roentgens per year whole body exposure including any exposure from non-weapons test activities (but excluding background and medical X-rays). The criterion of 3.9 Roentgens is in the definite context used in the past, i.e., every reasonable effort should be made to keep the radiation exposures as low as possible, but for planning purposes, if unanticipated yet credible circumstances could result in estimated doses in excess of 3.9 Roentgens per year, then the detonation should be postponed until more favorable conditions prevail. Also, to avoid any given community receiving unusually high exposures over a period of years, the guide shall be no more than 10 Roentgens in any consecutive 10-year period."

---

*AEC/Headquarters Memorandum to Manager, Nevada Operations Office, AEC, Las Vegas, Nevada, August 1, 1962.

III. OPERATIONAL PROCEDURES

Several days prior to the event, thirteen PHS monitors were fielded along the Aleutian Chain and at other locations in Alaska to collect background environmental samples, obtain background radioactivity measurements, and prepare for D-day activities. Each monitor was equipped with hand-held radiation survey instruments and environmental sampling supplies. The instruments included two scintillators for measuring low-level gamma activity in the background to 3 mR/hr range, and two Geiger-Mueller survey instruments for measurements in the background to 2 R/hr range. All monitors carried a personal thermoluminescent dosimeter (TLD) and carried extras for issue to residents and for supplementing those placed at fixed surveillance stations (see Section IV). The monitors were also equipped with supplies to collect samples of water, vegetation and precipitation.

A. Community Information

In addition to their monitoring duties, SWRHL monitors at St. Paul, Adak and Shemya were involved in briefing local residents and military officials on SWRHL activities and the Milrow Event in general. Three days prior to the event, the Adak monitor served on a panel of four on the local television station to answer questions pertaining to Milrow telephoned in by residents at the Adak naval installation. The St. Paul monitor briefed the St. Paul Village Council and interested members of the community, and visited Public Health Service and Coast Guard officials to discuss the event and SWRHL activities. The Shemya monitor held similar discussions with Air Force personnel there.

To provide Alaska state officials with information regarding the

SWRHL surveillance program, a briefing of state health department and fish and game department officials was conducted by the Project Officer. The briefing involved the presentation and discussion of the general Milrow surveillance plan as well as a discussion of specific surveillance activities in each area of interest. State health department officials were kept advised of SWRHL monitoring activities through the PHS state assignee in Anchorage.

Anticipated Milrow effects and the SWRHL environmental surveillance program were also explained to surveillance station operators and local residents at each of the 15 stations established by the Project Officer during July, August and September. Similar discussions were held whenever the opportunity arose during contact with Alaska residents and local or state officials.

B. Monitoring

1. Ground monitoring

Three monitors were stationed on the islands of Adak (from D-13 to D+4 days), St. Paul (from D-8 to D+6 days) and Shemya (from D-6 to D+2 days). Each monitor established and maintained a radiation surveillance station and collected background water samples.

For the period D-4 to D+1 days, four monitors were on standby at the SWRHL field office in Anchorage for local monitoring duties or for dispatch to other areas had this action become necessary.

2. Aerial monitoring

Aerial monitoring was performed by four monitors, two each aboard two Air Force C-130 aircraft. The responsibilities of the aerial teams included an initial post-event

survey of the surface ground zero area, tracking of any released radioactive effluent for four to six hours, and collection of cabin air samples for immediate gross beta activity analysis had a release occurred.

On D-4 days, the aerial crews arrived at Adak, the staging point for the Milrow aerial monitoring missions. On D-3 days, the two monitoring teams participated in a rehearsal of the monitoring flight in a single Air Force C-130 aircraft.

At 1030 hours on D day, both aircraft were airborne and enroute to a standby position downwind from ground zero. Following the detonation at 1206 hours, each aircraft made a single low altitude pass over surface ground zero. The first pass was at 1330 hours BDT and the second at 1335 hours BDT. Following these passes, both aircraft were released from their monitoring mission. One of the aircraft and crews was held on standby at Adak until the following morning.

3. Shipboard monitoring

To provide monitoring capabilities on the ocean near Amchitka Island, one SWRHL monitor boarded the USS Small at Adak on D-6, and a second monitor boarded the USS Strauss on D-5. The two naval vessels then moved to the Amchitka area for the D day activities.

In addition to hand-held portable survey instruments, the monitors were equipped with a portable scaler connected to a shielded end-window Geiger-Mueller detector. Each ship monitor collected pre-event and post-event air

samples and counted each filter for gross beta radioactivity with the portable counting system. Although not issued, five TLD's were available on each ship for issue to shipboard personnel if deemed desirable. Each monitor also collected pre-event ocean water samples.

At H hour, the two vessels were approximately 30 miles west of surface ground zero and approximately 50 miles southeast of surface ground zero, respectively. On D+2 days, both vessels docked at Adak to refuel and the monitors returned to Anchorage.

C. Field Communications

Communications between the Project Officer and SWRHL monitors at Adak and Shemya were provided by telephone. Amateur radio operators provided communications with the station monitor at St. Paul. Communications between the Project Officer and the PHS member of the Test Manager's Advisory Panel on Amchitka was through use of a Corps of Engineers radio at Elmendorf Air Force Base.

There was no direct communication between the Project Officer and the aerial surveillance aircraft. Information from the aerial sweeps was relayed directly to the Test Manager on Amchitka.

IV. ENVIRONMENTAL SURVEILLANCE

A network of 18 environmental surveillance stations was established along the Aleutian Island chain and coastal Alaska prior to the Milrow Event, as shown in Figure 1. At each station, three thermoluminescent dosimeters, a gamma-rate recorder and an air sampler were maintained. Fourteen of the 18 stations were operated by local residents between D-15 and D+14 days. The stations at Adak, Shemya, St. Paul and Anchorage were operated by SWRHL monitors for the periods D-12 to D+3 days, D-4 to D+1 days, D-7 to D+5 days and D-15 to D+2 days, respectively. Each station operator was responsible for the collection and mailing of air samples to SWRHL for analysis, operating a gamma-rate recorder, and exchanging TLD's.

A. Air Sampling

Air samplers consisted of an electrically driven positive displacement vacuum pump which pulled air through a 4-inch diameter Gelman Type E glass fiber filter followed by an activated charcoal cartridge. Sampling rates were 8 to 10 cfm. Continuous 24-hour samples were collected by the station operator and mailed daily to SWRHL for analysis. At the end of the sampling period, air samplers were returned to SWRHL field headquarters in Anchorage for storage.

Filters received an immediate gross beta count upon receipt at the laboratory. Any sample indicating a count rate over 500 cpm (approximately 1.5 pCi/m^3 for a 24-hour sample) would have been gamma scanned. Beta counts were repeated on the fifth and twelfth day after collection, and the results extrapolated to estimate the activity at the end of the collection period. All

charcoal cartridges received a 10-minute gamma scan upon receipt at SWRHL. Had any scan indicated a net integrated gamma count rate greater than 300 cpm, isotopic identification would have been made.

Additional air data were available to SWRHL from the nine Radiation Alert Network (RAN) air sampling stations in Alaska. These stations are operated as part of a national surveillance network by the PHS Bureau of Radiological Health. Field estimates of gross beta activity collected at each station are transmitted to Bureau headquarters in Rockville, Maryland, and selected filters may receive gross beta and gamma spectrum analyses.

B. Gamma-Rate Recorders

Gamma-rate recorders at each surveillance station were located inside buildings where normal day-to-day operations were conducted by the station operator. The recorders were operated continuously, and the station operator removed the chart for each one-week period and mailed it to the Project Officer in Anchorage for evaluation.

The gamma-rate recorder employed a gas-filled detector operating in the proportional region and recorded radiation exposure rates on a logarithmic chart, with a range of 0.01 to 100 mR/hr. The unit included a recorder that allowed a continuous recording time of approximately 25 days at a chart rate of two inches per hour.

C. Dosimetry

Three TLD's were mailed from SWRHL to each radiation surveillance station at D-7 weeks. Upon arrival, the TLD's were placed

in plastic containers in the vicinity of the other surveillance equipment. These TLD's were exchanged twice prior to the event with the second exchange made a few days before the event. The exchange dates are shown in Table 1.

Each packet of TLD's sent to the station operators included a control group of three TLD's that were returned immediately to SWRHL. This procedure provided in-transit background information for use in obtaining valid on-station TLD exposure.

Fresh TLD's were mailed to the Anchorage Field Headquarters for issue to SWRHL monitors several days prior to the event. These dosimeters were to be used to supplement the dosimeter network and/or for issue to residents, had any release of radioactivity occurred.

The TLD's used were EG&G TL-12 thermoluminescent CaF_2:Mn dosimeters, with a sensitivity range of approximately 5 mR to 5000 R for external gamma measurements. The dosimeter response is uniform for 50 keV to 2 MeV photons.

D. Milk Sampling

Since the only significant milk cow population in Alaska consists of several dairies in the immediate vicinity of Palmer, the PHS Pasteurized Milk Network(PMN) samples from the Palmer area were used to monitor radioactivity levels in milk during the Milrow operational period. Although the PMN is generally designed on a demographic (rather than geographic) basis to monitor trends in radioactivity levels in milk consumed by a large segment of the population, the Palmer station also represented a specific geographic area. If any release of radioactivity had occurred, additional samples from the Palmer area would have been collected.

Weekly samples from the PMN station were sent to SWRHL for gamma spectrum analysis, and the first sample of each month received a strontium-89/-90 analysis. Special samples would have received both gamma spectrum and strontium-89/-90 analyses.

E. Water Sampling

At each environmental surveillance station, one-gallon samples of potable water were collected. One-gallon samples of marine water were also collected by the two SWRHL monitors on board naval vessels. All water samples were returned to SWRHL for analysis. Since no radioactive release occurred, post-event water samples were not collected.

Each water sample received a gamma scan and a gross beta count. Strontium-90 analysis was to be performed when the gamma scan revealed the presence of iodine or barium, or upon indication of gross beta activity significantly above background levels.

F. Reindeer and Caribou Sampling

Muscle tissue from eight animals from the Adak and Peninsula caribou herds (four animals from each herd) was collected during August and September, respectively. This sampling was conducted as part of the PHS Reindeer and Caribou Sampling Program initiated in December 1963. Samples are collected once each year and sent to SWRHL for gamma spectrum analysis. If radioactivity had been released from the Milrow Event, special samples would have been collected as required from these herds, in addition to the routine yearly samples.

G. Marine Sampling

Prior to the event, SWRHL planned a salmon and King crab sampling program that would have been followed had any release of

radioactivity occurred. Since the commercial salmon season terminated in September, pre-event samples would have been obtained from commercially processed salmon stored in Seattle. Samples of post-event salmon would have been obtained through University of Washington research fishing vessels operating in the Amchitka area.

Pre-event King crab samples would also have been obtained from the Seattle source, although the King crab season was in progress throughout the Milrow operational period. Through the cooperation and assistance of the Alaska Department of Fish and Game, areas of major King crab fishing and locations of processing plants were identified for use in the post-event sampling plan. Crab caught in the Adak area were available for sampling at processors located at Adak. Unimak Pass catches were available for sampling at processing plants at Akutan and Unalaska. Western Alaska peninsula catches were being processed at plants at Sandpoint and King Cove. Additional processing plants at greater distances from Amchitka were located at Kodiak and Petersburg.

All marine samples would have been returned to SWRHL for tritium, strontium and gamma scan analysis, as required. Since no radioactive release occurred, no marine samples were collected.

V. RESULTS

The stations from the SWRHL radiation surveillance networks in Alaska detected no radioactivity above pre-event background levels following the event. The gamma scans of all charcoal cartridges from the air sampling stations showed no event related gamma activity, and all counting results on particulate filters showed background levels of gross beta activity. A summary of the gross beta counting results is shown in Table 1. Post-event air samples collected on the two naval vessels on D day and D+1 were counted for gross beta activity with portable counters, and also showed no activity above pre-event background levels. During the two passes over surface ground zero, the aerial monitoring teams did not detect airborne activity with survey instruments.

All charts from the radiation surveillance station gamma-rate recorders showed exposure rates no greater than background levels. The dosimetry data from TLD's presented in Table 2, showed no exposures significantly above background. A statistical analysis of the data shows a 15% increase in the relative average exposure rate (mR/day) over the three measuring periods. This increase is probably a seasonal trend in background levels. It is also possible that the observed trend was due to variables in the TLD system itself, but other work with the system in the same period indicates the system is more stable than the observed trend. The variation in the data is caused by the lengthy TLD transit periods from SWRHL to Alaska and back compared to the actual TLD exposure period at the surveillance station. Ten of the Alaskan TLD stations are being continued in an effort to establish more specific data for the network; these are located at Annette, Bethel, Cold Bay, Cordova, Homer, King Salmon, Kodiak, Mt. Edgecombe, Nome and Palmer.

Table 3 lists the location and analytical results for all pre-Milrow water samples. Since the results of aerial monitoring and the surveillance network stations indicated no increase in radiation levels above background, no post-event water samples were collected.

Milk samples collected by the Pasteurized Milk Network during October showed no increase in radioactivity over those samples collected during September. The results are tabulated in Table 4, indicating no activity above the minimum detectable activity for each radionuclide.

Results of the gamma spectrum analysis of samples from the Adak and Peninsula caribou muscle samples will be reported in a future publication of Radiological Health Data and Reports. Cesium-137 and strontium-89/-90 background information for samples collected prior to 1969 has been reported in the same publication for muscle, rumen and hock bones from animals of the following reindeer and caribou herds:

Shishmaref Reindeer	Peninsula Caribou
Nunivak Reindeer	Arctic Caribou
Nome Reindeer	Nelchina Caribou

VI. SUMMARY

The SWRHL off-site environmental surveillance program conducted for the Milrow Event indicated no radioactivity was released to the environment from the underground nuclear detonation. A network of air, dosimetry and radiation recorder stations showed no changes in environmental radioactivity levels following the event. Aerial monitoring of the surface ground zero area and shipboard monitoring near Amchitka Island on the day of detonation also showed no radioactivity above background levels.

SWRHL community information activities consisted of discussions regarding Milrow and SWRHL surveillance with Alaska residents, and briefing state and local officials on the Milrow programs. Special community information efforts were made at Shemya, Adak and St. Paul where reports indicated this activity to be successful in answering many questions about the Milrow Event.

Table 1. Summary of Milrow air sampling results

Station Location	Number of samples collected		Number of samples above MDA[a]		Average gross beta concentration above MDA[b] (pCi/m^3)	
	Pre-shot	Post-shot	Pre-shot	Post-shot	Pre-shot	Post-shot
Adak	11	2	5	0	0.2	---
Anchorage	13	11	6	2	0.2	0.3
Bethel	15	11	7	0	0.2	---
Cordova	15	12	2	3	0.3	0.3
Homer	12	10	2	2	0.1	0.2
Annette	12	5	0	1	---	0.3
King Salmon	15	15	1	1	0.2	0.3
Woody Island	15	14	1	3	0.3	0.2
Nome	9	9	4	2	0.2	0.2
Palmer	15	14	5	4	0.3	0.3
Seward	15	2	3	0	0.3	---
Shemya	4	2	0	0	---	---
Mt. Edgecombe	15	12	0	4	---	0.3
St. Paul	7	5	0	0	---	---
Unalakleet	15	13	10	1	0.3	0.3
Dutch Harbor	3	1	0	0	---	---
Cold Bay	14	11	1	0	0.2	---
Yakutat	10	12	0	4	---	0.3

[a] MDA-minimum detectable activity: That activity at which the 2-sigma counting error is $\leq 25\%$ of the net counting rate.

[b] Average was determined from those daily concentrations above detection limit. All concentrations were extrapolated to end of collection.

Table 2. Summary of Milrow dosimetry results

Location	Issue date	Collection date	Av. exposure rate[a] (mR/day) Pre-shot	Post-shot
Anchorage	9/02/69	9/13/69	0.05	
	9/13/69	9/26/69	0.03	
	9/26/69	10/24/69		0.14
Annette	8/14/69	9/11/69	0.00	
	9/11/69	10/01/69	0.04	
	10/1/69	12/06/69		0.25
Bethel	8/14/69	9/12/69	0.16	
	9/12/69	9/26/69	0.06	
				NDR[b]
Cold Bay	9/02/69	9/12/69	0.22	
	9/12/69	9/26/69	0.01	
	9/26/69	11/26/69		0.25
Cordova	8/14/69	9/12/69	0.26	
	9/12/69	9/26/69	0.28	
	9/26/69	11/28/69		0.41
Dutch Harbor	9/13/69	9/27/69	0.09	
				NDR
Homer	8/15/69	9/12/69	0.19	
	9/12/69	9/26/69	0.06	
	(9/26/69)[c]	11/14/69		0.26
King Salmon	8/15/69	9/12/69	0.15	
	9/12/69	9/29/69	0.09	
	9/29/69	12/01/69		0.31
Kodiak	8/14/69	9/12/69	0.13	
	9/12/69	9/26/69	0.06	
	9/26/69	11/18/69		0.30
Mt. Edgecombe	8/14/69	9/11/69	0.04	
	9/11/69	9/26/69	0.13	
	9/26/69	12/01/69		0.34
Nome	8/15/69	9/12/69	0.13	
				NDR
Palmer	8/14/69	9/11/69	0.18	
	9/11/69	9/27/69	0.13	
	9/27/69	11/25/69		0.32
Seward	9/15/69	9/29/69	0.05	
	9/29/69	11/21/69		0.35

Table 2. Summary of Milrow dosimetry results (continued)

Location	Issue date	Collection date	Av. exposure rate[a] (mR/day) Pre-shot	Post-shot
Unalakleet	9/14/69	9/29/69	0.14	
	9/26/69	11/20/69		0.25
Yakutat			NDR	
	(9/26/69)	(10/24/69)		0.22

[a] Average is for three dosimeters.

[b] No data received to date.

[c] Estimated date; field data card incomplete.

Table 3. Milrow water sampling results

Location	Source	Date Collected	Gross alpha pCi/l	Gross beta pCi/l	^{3}H pCi/l	Gamma spectrum
Adak, Alaska						
Hospital Coffee Room	Lake	9/23/69	<2	<2	530	NA
Amchitka Island, Alaska						
51° 28.0 N 178° 28.1 E	Ocean	10/02/69	27	140	<400	NA
51° 06 N 179° 04 E	Ocean	9/27/69	<2	204	<400	NA
Annette, Alaska						
FAA/FSS[a]	Well	8/29/69	<2	10	410	NA
Bethel, Alaska						
FAA Compound	Well	8/05/69	2	2	<400	NA
USPHS Hospital	Well	8/05/69	2	3	<400	NA
Cold Bay, Alaska						
FAA/FSS	Well	8/18/69	3	3	740	NA
Cordova, Alaska-FAA/FSS	Well	8/26/69	<2	2	<400	NA
Prince William Hotel	Reservoir	8/25/69	<2	<2	710	NA
Dutch Harbor, Alaska						
Reeve Air Terminal	Lake	8/19/69	2	10	520	NA
Homer, Alaska						
FAA/FSS	Well	9/12/69	<2	3	<400	NA
King Salmon, Alaska						
FAA/FSS	Well	8/06/69	<2	4	<400	NA
King Salmon Inn	Well	8/06/69	<2	7	<400	NA
Kodiak, Alaska						
Woody Island-FAA/FSS	Lake	8/14/69	<2	3	670	NA
Mt. Edgecombe, Alaska						
FAA/FSS	Well	8/29/69	2	2	530	NA
Nome, Alaska						
FAA/FSS	Spring	8/10/69	<2	2	720	NA
Palmer, Alaska						
Tost Chevron Station	Reservoir	9/04/69	<2	2	<400	NA
St. Paul Island, Alaska						
St. Paul Hotel	Well	9/29/69	<2	4	<400	NA
St. Paul Hotel	Well	10/7/69	2	6	500	NA

Table 3. Milrow water sampling results (continued)

Location	Source	Date Collected	Gross alpha pCi/l	Gross beta pCi/l	^{3}H pCi/l	Gamma spectrum
Seward, Alaska Fire Hall	Reser-voir	9/06/69	<2	4	570	NA
Shemya, Alaska Personnel Services Club	Well	9/29/69	<2	4	400	NA
Unalakleet, Alaska FAA Housing Area	Spring	8/11/69	<2	4	1200	NA
Yakutat, Alaska FAA/FSS	Well	8/27/69	<2	2	680	NA

NA - negligible activity

[a] FAA/FSS Federal Aviation Administration/Flight Service Station.

Table 4. Milrow milk sampling results

Location	Date Collected	^{140}Ba	^{137}Cs	^{131}I	^{89}Sr*	^{90}Sr*
Palmer, Alaska	9/08/69	<10	<10	<10	<5	6
	9/15/69	<10	<10	<10	--	--
	9/22/69	<10	<10	<10	--	--
	9/29/69	<10	<10	<10	--	--
Palmer, Alaska	10/06/69	<10	<10	<10	5	4
	10/13/69	<10	<10	<10	--	--
	10/20/69	<10	<10	<10	--	--
	10/27/69	<10	<10	<10	--	--

* Analysis for ^{89}Sr and ^{90}Sr performed only on first sample received each month.

Figure 1 SWRHL surveillance stations for the Milrow Event